IN THE SPECIFICATION:

Please amend the specification as follows:

Page 1, delete the whole paragraph starting in line 1 and replace it with the following new paragraph:

This application is a continuation-in-part of co-pending U.S. Application 10/157,033, entitled "LITHOGRAPHIC APPARATUS, DEVICE MANUFACTURING METHOD, DEVICE MANUFACTURED THEREBY, CONTROL SYSTEM, COMPUTER PROGRAM, AND COMPUTER PRODUCT," filed May 30, 2002, now U.S. Patent 6,737,662, the entire contents of which are incorporated herein by reference.

Page 1, delete the whole paragraph starting in line 10 and replace it with the following new paragraph:

2. Description of the Related Art

The term "patterning device" as here employed should be broadly interpreted as referring to device that can be used to endow an incoming radiation beam with a patterned cross-section, corresponding to a pattern that is to be created in a target portion of the substrate. The term "light valve" can also be used in this context. Generally, the pattern will correspond to a particular functional layer in a device being created in the target portion, such as an integrated circuit or other device (see below). An example of such a patterning device is a mask. The concept of a mask is well known in lithography, and it includes mask types such as binary, alternating phase-shift, and attenuated phase-shift, as well as various hybrid mask types. Placement of such a mask in the radiation beam causes selective transmission (in the case of a transmissive mask) or reflection (in the case of a reflective mask) of the radiation impinging on the mask, according to the pattern on the mask. In the case of a mask, the support ~~structure~~ will generally be a mask table, which ensures that the mask can be held at a desired position in the incoming radiation beam, and that it can be moved relative to the beam if so desired.

Page 1, delete the whole paragraph starting in line 25 and replace it with the following new paragraph:

Another example of a pattering device is a programmable mirror array. One example of such an array is a matrix-addressable surface having a viscoelastic control layer and a reflective surface. The basic principle behind such an apparatus is that, for example, addressed areas of the reflective surface reflect incident light as diffracted light, whereas unaddressed areas reflect incident light as undiffracted light. Using an appropriate filter, the undiffracted light can be filtered out of the reflected beam, leaving only the diffracted light behind. In this manner, the beam becomes patterned according to the addressing pattern of the matrix-addressable surface. An alternative embodiment of a programmable mirror array employs a matrix arrangement of tiny mirrors, each of which can be individually tilted about an axis by applying a suitable localized electric field, or by employing piezoelectric actuators. Once again, the mirrors are matrix-addressable, such that addressed mirrors will reflect an incoming radiation beam in a different direction to unaddressed mirrors. In this manner, the reflected beam is patterned according to the addressing pattern of the matrix-addressable mirrors. The required matrix addressing can be performed using suitable electronics. In both of the situations described hereabove, the patterning device can comprise one or more programmable mirror arrays. More information on mirror arrays as here referred to can be seen, for example, from United States Patents 5,296,891 and 5,523,193, and PCT patent applications WO 98/38597 and WO 98/33096, which are incorporated herein by reference. In the case of a programmable mirror array, the support ~~structure~~ may be embodied as a frame or table, for example, which may be fixed or movable as required.

Page 2, delete the whole paragraph starting in line 17 and replace it with the following new paragraph:

Another example of a pattering device is a programmable LCD array. An example of such a construction is given in U. S. Patent 5,229,872, which is incorporated herein by reference. As above, the support ~~structure~~ in this case may be embodied as a frame or table, for example, which may be fixed or movable as required.

Page 2, delete the whole paragraph starting in line 25 and replace it with the following new paragraph:

Lithographic projection apparatus can be used, for example, in the manufacture of integrated circuits (ICs). In such a case, the patterning device may generate a circuit pattern corresponding to an individual layer of the IC, and this pattern can be imaged onto a target portion (*e.g.* comprising one or more dies) on a substrate (silicon wafer) that has been coated with a layer of radiation-sensitive material (resist). In general, a single wafer will contain a whole network of adjacent target portions that are successively irradiated via the projection system, one at a time. In current apparatus, employing patterning by a mask on a mask table, a distinction can be made between two different types of machine. In one type of lithographic projection apparatus, each target portion is irradiated by exposing the entire mask pattern onto the target portion at once. Such an apparatus is commonly referred to as a wafer stepper. In an alternative apparatus, commonly referred to as a step-and-scan apparatus, each target portion is irradiated by progressively scanning the mask pattern under the ~~projection~~ beam in a given reference direction (the "scanning" direction) while synchronously scanning the substrate table parallel or anti-parallel to this direction. Since, in general, the projection system will have a magnification factor M (generally < 1), the speed V at which the substrate table is scanned will be a factor M times that at which the mask table is scanned. More information with regard to lithographic devices as here described can be seen, for example, from U.S. Patent 6,046,792, incorporated herein by reference.

Page 4, delete the whole paragraph starting in line 5 and replace it with the following new paragraph:

A projection apparatus, such as used in lithography, generally includes an illumination system, referred to hereafter simply as an illuminator. The illuminator receives radiation from a source, such as a laser, and produces a ~~projection~~ beam for illuminating an object, such as the patterning device (e.g. a mask on a mask table). Within a typical illuminator, the beam is shaped and controlled such that at a pupil plane the beam has a desired spatial intensity distribution. This spatial intensity distribution at the pupil plane effectively acts as a virtual radiation source for producing the ~~projection~~ beam. Following the pupil plane, the radiation is substantially focussed by a lens group referred to hereafter as

"coupling lens". The coupling lens couples the substantially focussed radiation into an integrator, such as a quartz rod. The function of the integrator is to improve the homogeneity of the spatial and/or angular intensity distribution of the projection beam. The spatial intensity distribution at the pupil plane is converted to an angular intensity distribuion at the object being illuminated by the coupling optics, because the pupil plane substantially coincides with the front focal plane of the coupling optics. Controlling the spatial intensity distribution at the pupil plane can be done to improve the processing latitudes when an image of the illuminated object is projected onto a substrate. In particular, spatial intensity distributions with dipole, annular or quadrupole off-axis illumination profiles have been proposed to enhance the resolution and other parameters of the projection, such as sensitivity to projection lens aberrations, exposure latitude and depth of focus.

Page 6, delete the whole paragraph starting in line 28 and replace it with the following new paragraph:

SUMMARY OF THE INVENTION

An aspect of the present invention is to provide an improved lithography apparatus with an illuminator which avoids or alleviates the above problems. A further object is to provide devices which can be used to generate predetermined intensity distributions of the ~~projection~~ beam.

Page 7, delete the whole paragraph starting in line 1 and replace it with the following new paragraph:

According to one aspect of the present invention there is provided a lithographic apparatus including a radiation system configured to provide a ~~projection~~ beam of radiation; a support configured to support a patterning device, the patterning device configured to pattern the ~~projection~~ beam according to a desired pattern; a substrate table configured to hold a substrate; and a projection system configured to project the patterned beam onto a target portion of the substrate, wherein the radiation system includes an illumination system configured to define an intensity distribution of the ~~projection~~ beam, the illumination system including a setting device configured to direct different parts of an incoming radiation beam into different directions to provide a desired angular intensity distribution of the ~~projection~~

beam at the patterning device, the setting device including a plurality of directing elements, each directing element configured to direct a corresponding part of the incoming radiation beam, and an orientation of each directing element is set to direct the corresponding part of the beam into a desired direction.

Page 10, delete the whole paragraph starting in line 23 and replace it with the following new paragraph:

According to a further aspect of the invention there is provided a device manufacturing method including ~~providing a substrate at least partially covered with a radiation-sensitive material;~~ providing ~~at least one projection~~ a beam of radiation; modifying the intensity distribution of the ~~projection~~ beam; using a patterning device to endow the modified ~~projection~~ beam with a pattern in its cross-section; and projecting the patterned beam of radiation onto a target which comprises at least a part of the radiation-sensitive material, wherein the modification of the intensity distribution of the projection beam includes setting the direction into which the radiation propagates using a setting device according to the present invention, wherein the beam comprises a plurality of sub-beams, wherein at least some of the sub-beams are directed into different directions using a plurality of reflectors, and orientations of the reflectors are set to direct the corresponding sub-beam into a desired direction.

Page 13, delete the whole paragraph starting in line 5 and replace it with the following new paragraph:

The source LA (e.g. a UV excimer laser, an undulator or wiggler provided around the path of an electron beam in a storage ring or synchrotron, a laser-produced plasma source, a discharge source or an electron or ion beam source) produces radiation. The radiation is fed into an illumination system (illuminator) IL, either directly or after having traversed a conditioner, such as a beam expander Ex, for example. The illuminator IL may comprise an adjusting device AM configured to set the outer and/or inner radial extent (commonly referred to as σ-outer and σ-inner, respectively) of the intensity distribution in the beam. In addition, it will generally comprise various other components, such as an integrator IN and a

condenser CO. In this way, the ~~projection~~ beam PB impinging on the mask MA has a desired uniformity and intensity distribution in its cross-section.

Page 13, delete the whole paragraph starting in line 20 and replace it with the following new paragraph:

In particular, the present invention encompasses embodiments wherein the illuminator IL is configured to supply a ~~projection~~ beam of radiation having a wavelength of less than about 170 nm, such as with wavelengths of 157 nm, 126 nm and 13.6 nm, for example.

Page 13, delete the whole paragraph starting in line 23 and replace it with the following new paragraph:

The ~~projection~~ beam PB subsequently intercepts the mask MA, which is held on the mask table MT. Having traversed the mask MA, the ~~projection~~ beam PB passes through the lens PL, which focuses the beam PB onto a target portion C of the substrate W. With the aid of the second positioning device PW and interferometer(s) IF, the substrate table WT can be moved accurately, e.g. so as to position different target portions C in the path of the beam PB. Similarly, the first positioning device PM can be used to accurately position the mask MA with respect to the path of the beam PB, e.g. after mechanical retrieval of the mask MA from a mask library, or during a scan. In general, movement of the object tables MT, WT will be realized with the aid of a long-stroke module (coarse positioning) and a short-stroke module (fine positioning). However, in the case of a wafer stepper (as opposed to a step and scan apparatus) the mask table MT may just be connected to a short stroke actuator, or may be fixed. The mask MA and the substrate W may be aligned using mask alignment marks M_1, M_2 and substrate alignment marks P_1, P_2.

Page 14, delete the whole paragraph starting in line 3 and replace it with the following new paragraph:

The depicted apparatus can be used in two different modes:

1. In step mode, the mask table MT is kept essentially stationary, and an entire mask image is projected at once, i.e. a single "flash," onto a target portion C. The substrate table WT is then shifted in the X and/or Y directions so that a different target portion C can be irradiated by the beam PB;

2. In scan mode, essentially the same scenario applies, except that a given target portion C is not exposed in a single "flash." Instead, the mask table MT is movable in a given direction (the so-called "scan direction", e.g. the Y direction) with a speed v, so that the ~~projection~~ beam PB is caused to scan over a mask image. Concurrently, the substrate table WT is simultaneously moved in the same or opposite direction at a speed V = Mv, in which M is the magnification of the lens PL (typically, M = 1/4 or 1/5). In this manner, a relatively large target portion C can be exposed, without having to compromise on resolution.